



**OPERATING MANUAL
BATTERY MONITORS BCM 1 / BCM 2 / BCM G
SOFTWARE REV 2**



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1 INTRODUCTION

Dear customer,

Thank you for buying the Battery Monitor BCM. This digital unit is the state of the art in battery monitoring technology. A 16-bit-micro [µ] captures charging and load currents with very high accuracy by using an active precision Shunt.

On the large, illuminated display you can read:

- the capacity status of the service battery
- load / discharge current
- the voltage
- the remaining run time to the alarm level at the present amperage draw
- the voltage of up to two starting/auxiliary batteries

You have the possibility of adjusting an alarm threshold:

- either if the capacity of the main battery is low
- or the voltages of the additional batteries are low.

The software of the BCM supervises the voltage and current of the main battery constantly and recognizes when the battery is fully charged or even totally discharged. At every cycle, the value of the capacity of the battery and the charging efficiency factor (CEF) will be stated and corrected to get the most exact value of the capacity.

Please read the Instruction Manual carefully and follow all instructions before putting the equipment into operation.

1.1 PURPOSE

BCM Battery Monitors can only be used with a Shunt SHA 300 or SHA 610 (also with former types SHA 150 & SHA 600) for voltages of 8-30V DC, or with model BCM 48V for voltages of 12-60V DC. They were designed for use on yachts or camper vans and must be used in an enclosed environment which is protected against rain, moisture, dust and condensation. Do not use the BCM battery monitors in places where there could be danger of explosion by gas or dust.

1.2 CONTENTS

- Battery monitor BCM 1, or BCM 2, or BCM G
- Connecting cable to the Shunt including connecting plugs
- This Instruction Manual

1.3 ACCESSORIES (TO BE ORDERED SEPARATELY)

- | | |
|---|-----------------------|
| ● Active Shunt 300A, max. current 300A (400A 1 min, 1500A 0,5s) | Order.Nr. 0 7000 0300 |
| ● Active Shunt 600A, max. current 600A | Order.Nr. 0 7000 0610 |
| ● Active Shunt 300A, adress A2 (BCM 2 only) | Order.Nr. 0 7000 0302 |
| ● Active Shunt 600A, adress A2 (BCM 2 only) | Order.Nr. 0 7000 0612 |
| ● Connecting cable 10m including connecting plugs | Order.Nr. 0 7000 1091 |
| ● Fuseholder incl. 1A-Fuse for the measuring lines (add. batteries) | Order.Nr. 6 0030 3411 |



1.4 WARRANTY

philippi elektrische systeme gmbh grants a two year limited and non-transferable warranty for the first buyer of this equipment, commencing on the date of purchase and covers defects in manufacturing, parts and materials. Production or material defects will be corrected without costs if:

- the equipment is sent to us at the expense of the sender
- an Invoice or proof of purchase (copy) is included
- the equipment was used for its intended purpose
- no unauthorised parts were added, and the equipment was not exposed to extreme conditions

Not included in the warranty are damages from:

- overvoltage on the inputs or reverse polarity
- ingress of liquids, vapours, condensation, etc.
- lightning

Follow-up costs and normal wear and tear are not covered under warranty.



In case of warranty the defect must be clearly specified. A detailed description of the defect will ease and speed up the repair.

Please note that we cannot accept carriage forward deliveries.

1.5 EXCLUSION OF LIABILITY

Both adherence to the operating instructions, and the conditions and methods used during installation, use, and maintenance of the BCM cannot be supervised by philippi electrical systems. Therefore we do not take any responsibility for loss, damage or costs, which develop due to incorrect installation and/or inappropriate use.

1.6 QUALITY MANAGEMENT

During the process of manufacturing all devices pass several checks, controls and tests. Production, controls and tests are due to given protocols. Each BCM has its own serial number. Please do not remove this label. The assembly and testing of all BCM devices is carried out completely in our company at Remseck am Neckar. Germany.

2 SAFETY REFERENCES

- unauthorized changes to the equipment will invalidate the CE sign
- the installation of the BCM may be made only by electrical specialists.
- before connection of the BCM the battery terminals must be clamped.
- Important! Pay attention to the correct polarity of the batteries!
- the nuts securing the cables to the Shunt(s) must be fully tightened.



The assembly and operating instruction is a component of the BCM package. It must be kept (for reference). Importantly: - for later maintenance work - and for the use of subsequent owners of the equipment.



3 INSTALLATION



IMPORTANT NOTE: Do not insert the fuse (1A) into the fuseholder in the red supply wire at the shunt SHA before finishing the complete installation of all components. Otherwise the system could be damaged or even totally destroyed. Before disconnecting the wiring plugs on the components, the fuse must first be removed.

3.1 TIP

The battery monitor BCM should be connected always to the power supply and switched on to supervise every small amount of current, even if the system is supposed to be switched off. Often it is possible to still charge and/or discharge the batteries with a main switch that is turned off. This current has to be recorded, otherwise the BCM is unable to calculate the capacity properly.

Only during winter storage, if the system is totally out of service, the power supply of the BCM can be switched off. Due to the very small amount of power consumption, the continuous operating is not a handicap for your battery. The power consumption is 3mA plus 5 mA for the Shunt SHA 300.

3.2 NECESSARY EQUIPMENT

The following parts are needed for the installation of the BCM:

- an active shunt type SHA 300 or SHA 610.
- in case the distance between battery monitor BCM and shunt is longer than 5m, a shielded cable. 5x0,25mm² or the optional 10m-cable is required.
- 2 cables with min. 1 mm² cross-section long enough to connect the BCM with the starting/auxilliary batteries.
- 2 fuse holders with 1A fuses to fuse the wires from the two starting or auxilliary batteries.
- a battery cable, which is as short as possible, to connect the Shunt and the negative pole of the main battery leads. The cross-section of this cable should be usually 35 to 70 mm².

3.3 INSTALLATION AND CONNECTION

Please install the BCM in a visible place, so that it can be read off at any time. The necessary installation cutout is 88 x 88mm, the necessary minimum depth is 40mm. Install the active Shunt SHA as close as possible to the service battery. Ensure that accidental contact with the positive terminals on the battery is not possible. Connect the post of the Shunt marked "B" with the minus connection of the main battery by a short, thick cable (35-70mm²). Connect the house supply negative, plus the negative poles of any starting or auxiliary batteries to the post on the other side of the Shunt, marked "V".

Note: If the main battery consists of several parallel switched batteries, then their negative poles must all be attached to the post of the Shunt marked "B". The negative cables of starting and auxiliary batteries are connected to the other side (V) of the Shunt. We recommend that all minus connections of the loads and charging devices plus the negative poles of starting and auxilliary batteries be on a common bus bar, and from there a short line be made to the V post of the Shunt.

Connect the red measuring and supply line of the Shunt to the positive terminal of the main battery. This wire is equipped with an in-line safety fuse (1A). Over this line the voltage of the main battery is measured and at the same time the battery monitor BCM is supplied. This line is installed on the connector plug at pin No. 6 (+).

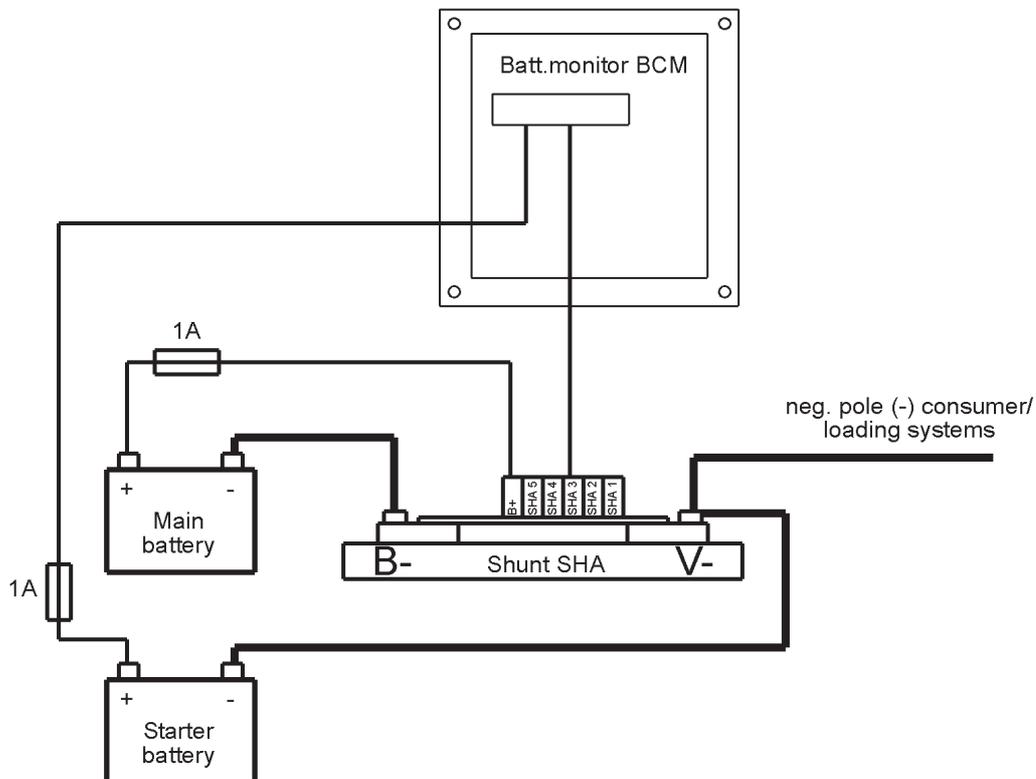


The fuse must not be inserted before finishing the whole installation!

- Connect the plugs of the provided 5-pole cable to the Shunt and to the back of the BCM using the appropriate sockets. If the cable needs to be extended or shortened, the contacts (1,2,3,4,5) with same number have to be connected to each other.

- Install a positive measuring line from the BCM to the additional starter and/or further groups of batteries, whose voltages are to be supervised. Install the fuse holders in the plus wires of these measuring wires as close to the battery as possible. Insert the fuse into the holder and check whether the display indicates values for the additional batteries.

WIRING DIAGRAM BCM 1:



3.3.1 CONNECTION OF THE BCM 2

The communication between the BCM2 and the Shunts is in digital format. For the correct operation of the system, two Shunts with different identifications are required. Please take care that one Shunt has the A2 - label and the other does not.

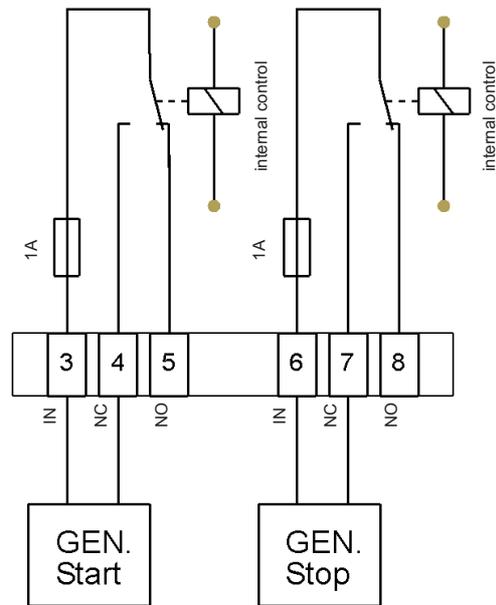
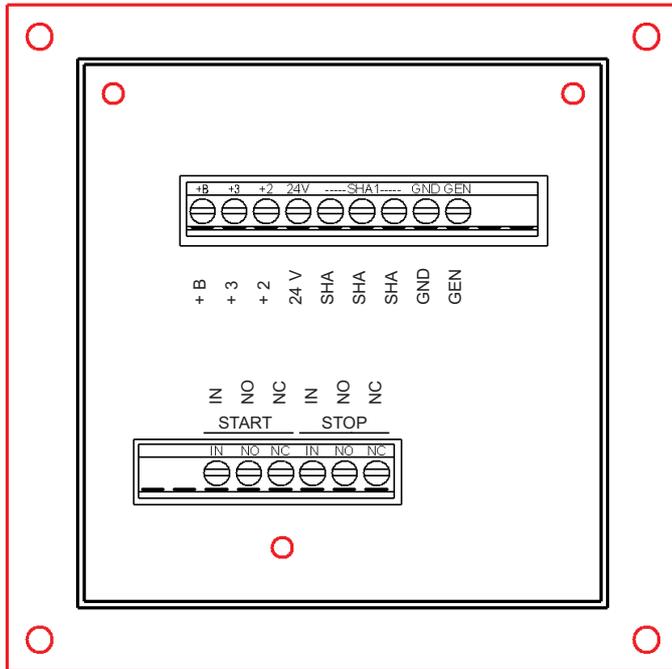
Depending on the hardware, both of the Shunts have to be connected either in parallel to the one socket, or to separate sockets. Please take special care on the correct wiring according to the connection diagram. Otherwise the components could be destroyed!



3.3.2 CONNECTION OF THE BCM-G

The operation of the Generator can be enabled if an external Signal of 12 or 24 V is connected to the terminal GEN on the back side of the BCM monitor.

A generator with automatic start is connected to the terminals labeled "Gen Start". A generator with start and stop buttons will be connected as shown.



4. START UP

BRIEF INSTRUCTION:

- 1) Please choose the nominal voltage of your plant (12V / 24V / 36V / 48V)
- 2) Charge your main battery until the BCM has recognized the capacity as 100%.
- 3) Adjust the capacity of your battery in the SETUP-Menu.

4.1 SYNCHRONISATION WITH THE MAIN BATTERY

To initialize the BCM the first time it is necessary to adapt the setup so that the battery monitor works correctly. In order to synchronize the battery monitor with the main battery, the main battery must be fully charged with a modern battery charger, in order to guarantee that the batteries are charged 100%.

We recommend the modern digital controlled philippi-battery chargers series AL. When the main battery is fully charged, the BCM capacity-value goes to 100%. When delivered, the factory setting of the BCM is 70%. At this point your BCM is now synchronized with the main battery. Now adjust the capacity of your battery in the SETUP, so that the BCM can work correctly.



4.2 SETTING UP THE PARAMETERS

For normal function it is necessary to adjust the BCM to the existing battery plant.

4.2.1 ADJUSTING THE CAPACITY

The factory setting of the battery capacity is 100Ah. To get a meaningful accuracy of the remaining time function as well as the proportional charge calculation, the capacity of the installed main battery must be adjusted. The battery capacity is stored in the SETUP menu.

Please note that the capacity of the battery should be set only if the batteries are charged 100%. During this procedure the actual capacity is set to 100% and all other internal values are set to 0.

4.2.2 ADJUSTING THE NOMINAL VOLTAGE

To assess when the battery is fully charged, several parameters must be satisfied, and the nominal voltage has to be adjusted. Please select between 12, 24, 36 and 48V.

4.2.3 ADJUSTING THE CAPACITY ALARM OF THE MAIN BATTERY

The BCM supervises the charge of the main battery and produces an alarm if the main battery falls below an adjustable capacity threshold. If the battery capacity falls below the adjusted threshold a warning appears in the display and at the same time a buzzing signal is sounded, which can be cancelled by the operator. The alarm for the capacity threshold is pre-set to 45% of the overall capacity of the battery. For an average application this value normally is correct; the alarm can be adjusted however according to the requirements of the application.

4.2.4 ADJUSTING THE VOLTAGE ALARM OF THE ADDITIONAL BATTERIES

The BCM supervises the battery voltages of batteries 2 and 3, and produces an alarm if the battery voltage falls for a fixed time (4min) under an adjustable value. A warning appears in the display and at the same time a buzzer will sound, which can be cancelled by the operator. The voltage alarm threshold is pre-set to 11.5V. If the battery is normally deeply discharged, then the voltage alarm threshold can be set somewhat lower, for example to 10.8V. If different battery systems (12V/24V) are connected, the thresholds have to be set according to the rated voltages. If no batteries are connected to 2 and/or 3, then the alarm threshold can be arbitrarily adjusted, because the BCM will recognise this and not cause an alarm. If desired, if no battery 2 or 3 is connected, the main battery can also be connected as battery 2 to provide a low voltage alarm in addition to the alarm for capacity.

5 OPERATION

The voltage and current of the main battery are under constant surveillance from the BCM software. The BCM recognizes if the battery is fully charged or completely discharged. The values of the battery capacity and the charging efficiency factor (CEF) are adjusted at each cycle to get the most exact indication of the capacity.

THE MAIN BATTERY IS CLASSIFIED AS COMPLETELY CHARGED (100%), IF:

- 1) the charging voltage has been reached (normally adjusted to 13.6/27.2V)
- 2) the charging current sinks under 2% of the battery capacity (e.g. 100Ah x 2% = 2 amps)
- 3) all amp/hrs that had been discharged in that cycle have been charged back into the battery. If all specified parameters (1, 2 and 3) are fulfilled for 4minutes, the value is put back to 100%. Then the charging efficiency factor CEF is calculated by the actual cycle and the average of the past 4 cycles. This new value is the calculation basis of the next cycle.



5.2 THE MAIN BATTERY IS CLASSIFIED AS NEARLY EMPTY (20%), IF:

the voltage of the main battery measured at the Shunt stays for a prescribed time (30sec - 3min) under a certain voltage, which is decided by the software. A warning message is then displayed, "Battery 1 empty", and at the same time a buzzing signal is sounding, which can be cancelled by the operator.

5.3 THE MAIN BATTERY IS CLASSIFIED AS COMPLETELY DISCHARGED (0%), IF:

the voltage of the main battery measured at the Shunt stays for a prescribed time (30sec - 3min) under a certain voltage, which is decided by the software. In that case the determined capacity at the end of that discharging cycle is the base for the new battery capacity. To compensate for the variation, the average is made over the actual and the last cycle. A warning message is then displayed, "Battery 1 deep discharged", and at the same time a buzzing signal is sounding, which can be cancelled by the operator.

All these functions are automatic and do not need any external adjustment.

5.4 SELF-DISCHARGING OF A BATTERY

Because most lead-batteries self-discharge internally, that amount cannot be registered by the Shunt and the BCM. Because of this, a battery may have to be synchronized again if the battery is not used for a long time. All that is required is to charge the battery completely again. The BCM will recognise the full charging automatically.

5.5 GENERATOR CONTROL (BCM-G ONLY)

A generator can be automatically started and stopped via the integrated potential-free contacts that are located at the back of the BSM-G unit. The switching is controlled by the capacity thresholds set by the operator in the set-up menu. The generator will be automatically started when the battery capacity reaches the Generator Start threshold. The Generator is then started, and the main battery will be charged by the battery charger until the battery capacity reaches the Generator Stop level, at which point the generator will be stopped. There are also two fail-safe low-voltage thresholds that will initiate a generator start if they are reached.

Permitted generator operating hours

The operation of the generator will only be activated by the BCM-G while within the allowed operating time. No noise while sleeping! If the time of day is outside permitted operating hours, the generator will not be started, and it will not start even if the main battery capacity falls to the Gen Start threshold. The permitted operation time has priority over the Gen Start settings.

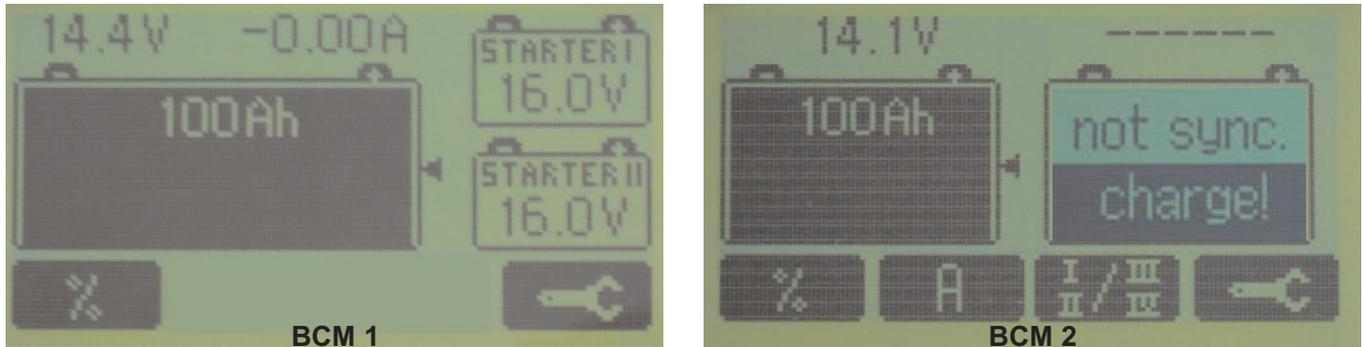
External lock

The operation of the generator can be locked if an external signal of 10-30 V is connected to the terminal "Gen". When the locking is active it is shown with a key symbol in the main battery. The lock has maximum priority over all other functions.



6. OPERATION

The left hand side of the back-lit display shows the charge status of the main battery. The line above the battery shows the charge or discharge current (A), while the remaining available capacity in Amp-hours (Ah) is



shown inside the battery graphic. The current is displayed to a resolution of 3 digits, e.g. 120A, 45,0A or 0.01A. A minus sign before the amp reading indicates that the battery is discharging. If no minus sign is present, then the battery will be charging at the amperage shown. If up to two further sets of batteries (like starting batteries) are connected, the voltage will be automatically displayed at the right side of the screen.

BCM-G An active generator is indicated by a “G” within the main battery graphic. When the locking is active it is shown by a key symbol in the main battery.

BCM-2 The main screen of the model BCM 2 shows the 2 main batteries monitored by the Shunts. The Shunt named SHA xxx will be shown on the left. The Shunt named SHA xxx-A2 will be shown on the right.

BUTTON - Ah / t / %:

Amp/Hrs, Time, or Percentage of Charge remaining. The remaining capacity of the main battery is indicated in Amp/Hrs, and as a percentage of the battery capacity. During charging the charge efficiency factor (C.E.F.) is automatically computed into the calculation. The remaining time is the time to the capacity alarm threshold at the present current draw. **WARNING** - The remaining time indication will change with time and with every change in the discharge current, and is corrected automatically with consideration to the Peukert exponent if the battery is discharged stronger than at the C20 rate.

Note: - the battery must be recharged before depletion to avoid damage! During charging the remaining time indicates 99.9 h. The maximum value during a discharge process amounts to 99.9 hours (> 4 days).

BUTTON - V/A: VOLTAGE OR CURRENT OF THE MAIN BATTERY (BCM 2 only)

Display shows the main battery voltage or the load/discharge current.

BUTTON - II/III: Displays voltage of batteries 3 and 4 (BCM 2 only)

If an additional battery is connected, its voltage will be displayed on the second page. By pressing the button you can switch between the two readings.

**BUTTON - GENERATOR (BCM-G only)**

By pressing the button "GEN ON" for a minimum of 5 seconds it is possible to start the generator manually at any time. The generator will run until:

- a) it is switched off manually
- b) the battery capacity reaches the "Generator Stop" threshold
- c) the battery capacity reaches 99%

By pressing the button "GEN OFF" for a minimum of 5 seconds it is possible to stop the generator manually at any time. The generator will be stopped until:

- a) it is switched on manually
- b) during permitted operating time, the battery capacity reaches the Generator Start threshold.
- c) during permitted operating time the main battery is indicated as empty
- d) during permitted operating time the main battery is indicated as deeply discharged

BUTTON – SET UP

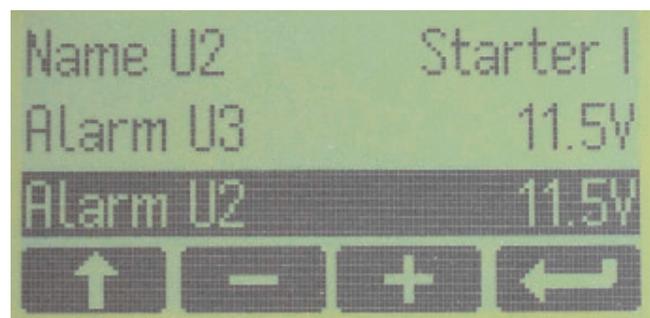
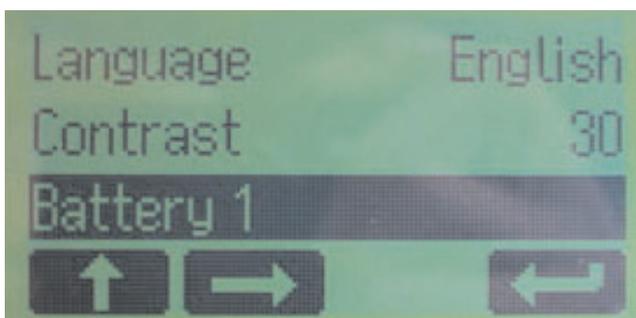
In the SETUP menu all necessary settings can be adjusted and statistical values can be shown (Chapter 6.1). By pressing the SETUP Button for 5 seconds, the SETUP menu can be locked. Repeating this process will unlock the SETUP menu.

RESET of counter

If the main battery bank is replaced, the counter for cycles and deep discharges has to be reset. Highlight "Cycles" in the battery menu and press the reset button or 10 seconds minimum. After that, the counter will be zero.

6.1 SETUP

In the event of a power interruption, all settings are saved in the memory and will not be lost.

6.1.1 MAIN MENU

The SETUP main menu shows the following:

Battery 1	Sub menu for main battery 1
Battery 2	Sub menu for main battery 2 (BCM 2 only)
Gen Set	Sub menu for generator control (BCM-G only)
Contrast	Display contrast
Language	language
Alarm U2 / (U3)	Level for Voltage Alarm Battery 2 (Battery 3 on BCM 2)
Alarm U3 / (U4)	Level for Voltage Alarm Battery 3 (Battery 4 on BCM 2)
Name U2 / (U3)	indicated name for Battery 2 (Battery 3 on BCM 2)
Name U3 / (U4)	indicated name for Battery 3 (Battery 4 on BCM 2)
Time	Actual time of day (BCM-G only)
Info	Models name and the software release / factory reset

CONTRAST

The contrast of the display can be adjusted by pressing the +/- button.

LANGUAGE

By pressing the buttons +/- the language of the SETUP menu can be changed. The following languages are available: German / English / French

ALARM / NAMING OF BATTERIES 2 to 4

The low-voltage alarm threshold of the additional start/auxiliary batteries is set here. Please refer to chapter 4.2.4. Also, the additional batteries can be given names.

TIME (BCM-G only)

To control the operation of the generator only within specified time limits, the current time needs to be set. The hours and the minutes can be set individually. An overflow of minutes or hours will reset to zero.

INFO

Shows the model name and the software release. By pressing the "factory" button for a minimum of 10 seconds, the BCM will be reset to the factory default settings.

6.1.2 SUB MENU MAIN BATTERY

This sub menu has to be set on the BCM2 for both batteries separately
The SETUP battery menu shows the following:

Capacity:	Nominal capacity of the main battery in Amp/Hrs
Nominal voltage	Nominal voltage of the main battery
Capacity alarm	Threshold level for capacity alarm in %
CEF	Charge Efficiency Factor
Peukert	Peukert exponent
Cycles depth	The depth of a discharge, in %, for a cycle to be counted
Cycles	Number of cycles
Deep discharges	Number of deep discharges
Discharge avg.	average value that the main battery has been discharged

**CAPACITY / NOMINAL VOLTAGE / CAPACITY ALARM %**

see chapter 4.2.1 - 4.2.3.

CEF:

Charge Efficiency Factor Each battery has an efficiency factor. This means that more ampere-hours have to be charged into the battery than can be used. The efficiencies of lead batteries lies between 80% and 99%. When the CEF drops below 70%, this indicates that the battery may have reached the end of its life span. If the battery is charged only with a trickle charge (for example with solar panels), the CEF will fall also, but if you use the battery again, this factor should rise. The factory-installed pre-setting is 95%. The CEF is adapted automatically by the BCM while in operation on a sliding average over the 4 last cycles.

PEUKERT EXPONENT

Standard batteries are rated for 20 hours discharge. That means for example, that a 100 amp/hour battery will produce 5 amps for 20 hours, before the battery voltage falls to 10.5. If the discharge current is higher, for example 10 amps, then the battery is not able to supply the full 100 ampere-hours. In this case the battery voltage will fall under 10.5 volts before the battery has supplied its rated capacity. This can be adjusted mathematically with the Peukert equation. This equation is used in the BCM in order to adapt the remaining time feature when high discharge rates are present. Under normal conditions the Peukert exponent does not need to be changed. The factory setting is 1,27.

CYCLES DEPTH

The cycles depth indicates the value, in %, that the main battery has to be discharged and charged to be counted as a cycle. The default value is 30%.

NUMBER OF CYCLES

A cycle is counted, if the battery was discharged below the low capacity alarm threshold (alarm %), and afterwards charged again to least 85% its capacity. With the number of cycles you are able to estimate the life span of your battery. Modern batteries, particularly AGM batteries, are considered to be dual-purpose, i.e. used for either house supply or starting, and can have life expectancies in excess of 500 cycles. However, these values can be obtained only with normal care, and worsen rapidly if the battery is damaged or misused.

NUMBER OF DEEP DISCHARGES

If the main battery is discharged for 4 min under 10.0V for a 12V battery, then this is rated as a deep discharge. Deep discharges should be absolutely avoided, since they damage the battery and a premature loss of capacity is to be expected. If a deep discharge should accidentally occur, then the battery must be charged immediately again, in order to avoid further damage.

AVERAGE DISCHARGE.

The Average Discharge indicates the average capacity that the main battery has been discharged to. With this value you can see how intensive the main battery was used. The smaller this value is, the deeper the main battery has been discharged on average, and regular deep discharges will reduce the life-span of a battery.



6.1.3 SUB MENU GEN SET (BCM-G only)

The SETUP generator shows the following:

Gen Set ON	The amp/hr threshold at which the generator will be started (Gen set on),
Gen Set OFF	The amp/hr threshold at which the generator will be stopped (Gen set off).
Operation start.	The time of day after which generator start is allowed.
Operation end	The time of day after which no generator start is allowed.
Type	Type of Start/Stop signal. i.e. Contact or pulse
Pulse length	Length of pulse for generator start and stop (only available at "pulse")

OPERATION

Generator start and stop The generator will be started when the battery capacity falls beneath the Gen Start threshold. The main battery will then be charged by a battery charger powered by the generator until the battery capacity reaches the Gen Stop threshold, at which point the generator will be stopped.

OPERATION TIME

The automatic operation of the generator will only be activated by the BCM during the allowed operating times. If it is required to always allow the generator to be started automatically, the Gen Start and Gen Stop times must be set to be the same.

TYPE / IMPULSE LENGTH

If a generator has an automatic start that requires a constant signal, "Contact" has to be selected and the terminal Gen Start is to be used. The relay contact will be closed as long as the generator is required to be run. If a generator requires a pulsed start and stop signal, "Pulse" has to be selected and the Gen Start and Gen Stop terminals are used. For starting, the Gen Start contact will be closed for the time selected in "Pulse Length". For stopping, the Gen Stop contacts will be closed for the time selected in "Pulse Length".

7. TROUBLESHOOTING

The software of the BCM is under continuous updating. Depending on your type of software it's possible that some functions aren't available in your BCM. Please ask for a free update.

NO DISPLAY ON THE MONITOR (BCM, BCM2, BLM)

● Check the power supply. Power for the BCM is supplied through the Shunt. On the plug on the rear of the BCM there is a battery negative feed to terminal number 1, and positive on terminal number 5, which is supplied through the + measuring line at the Shunt. If there is no voltage measurable between the terminals 1 and 5 (see diagram on page 7), check the fuse of the shunt and the wiring respectively.

DISPLAY OF VOLTAGE/CURRENT OF THE MAIN BATTERY IS ALWAYS "----" (BCM, BCM2, BLM)

● Check the power supply of the Shunt. The Shunt is supplied from the BCM. Between the terminals 1 (minus) and 5 should be a voltage of 7V. If there is no voltage, either the BCM or the shunt is defective. Please send the BCM and the shunt to our company.

- Communication interface RS485 has failed. Please send the BCM **and** the shunt to our company.

ONLY NEGATIVE (DISCHARGING) VALUES ARE SHOWN (BCM, BCM2, BLM)

- check the correct wiring of the Shunt SHA. The post marked "B" must be connected to the negative pole of the battery, and the post marked "V" has to be connected to the house load negatives and the minus of the charger and alternator. There must be no loads or charge sources connected directly to the negative pole of the battery, otherwise this amount of current can not be measured.

ONLY ONE BATTERY IS DISPLAYED ALTHOUGH TWO SHUNTS ARE INSTALLED (BCM 2)

- Check if both shunts have different addresses. (one is the normal, the other must be an "A2" version)

8. MAINTENANCE

The BCM does not require special maintenance. The front panel can be cleaned with a damp cloth without using aggressive detergents.

9. TECHNICAL DATA

	BCM 1, 2, G	BCM 1, 2 (48V)	Resolution
Measuring range voltage	8,5-30 V DC	10,5-60 V DC	(0,01 V)
Measuring range current	0-600 A	0-600 A	(0,01A)
Measuring range Amphours	0-6000 Ah	0-6000 Ah	(1 Ah)
Remaining time	0-99,9 h	0-99,9 h	(6 min)
Power supply	8,5-30 V DC	10,5-60 V DC	
Power consumption	3,5mA during operation, 55mA with illumination (for 12V-plants)		
Dimensions:	105x105x40mm		

SHA 300 / SHA 610, active shunt 300 A /30mV or 600 A/60mV

Accuracy voltage:	$\pm 0,6\% \pm 1$ digit
Accuracy current:	$\pm 0,8\% \pm 1$ digit



10 CE DECLARATION OF CONFORMITY

philippi elektrische systeme gmbh

Neckaraue 19
71686 Remseck am Neckar
Deutschland



certifies herewith, that the

products:

Battery Monitor BCM 1
Battery Monitor BCM 2
Battery Monitor BCM G12, G24

Shunt SHA 300
Shunt SHA 610

fulfills the requirements of the European Regulation 2004/108/EG

Following harmonised standards were implemented:

Immunity:	EN 61000-6-1:2007
Emission:	EN 61000-6-3:2007

Remseck, March 2010

Dipl.-Ing. Michael Kögel
Geschäftsführer philippi